antireflection film 19 for laser light emitted from the surface-emitting semiconductor element is formed on the p-type GaAs cap later 18 by electron beam evaporation or the like. A ring-shaped area of the SiO_2 antireflection film 19 is removed, and then a Ti/Pt/Au p-electrode 20 is formed by evaporation using the lift-off technique on a ring-shaped area covering the above area from which the SiO_2 antireflection film 19 is removed. Thereafter, the n-type GaAs substrate 11 is polished, and regions of the n-type GaAs substrate 11 and the n-type GaAs buffer layer 12 which are broader than an oscillation region of the surface-emitting semiconductor element are removed by selective etching so that a hollow which allows passage of excitation laser light is formed. Then, a AuGe/Ni/Au n-electrode 21 is formed on the remaining area of the back surface of the n-type GaAs substrate 11, and heat treatment is performed so as to make the Ti/Pt/Au p-electrode 20 and the AuGe/Ni/Au n-electrode 21 ohmic electrodes. Next, a SiO_2 film 22 is formed so as to cover the inner surface of the hollow, where the SiO_2 film 22 functions as an antireflection film for excitation laser light having the wavelength of 810 nm. Finally, the layered structure formed as above is cleaved, and is further formed into a chip of the surface-emitting semiconductor element 23.

Paragraph bridging pages 18 and 19:

An n-type GaAs buffer layer 52, a Bragg reflection film 53, an n-type GaAs optical confinement layer 54, an undoped GaAs/$In_{0.2}Ga_{0.8}As$ multiple-quantum-well active layer 55, an n-type GaAs optical confinement layer 56, and an n-type $Al_{0.7}Ga_{0.3}As$ carrier confinement layer 57 are formed on an n-type GaAs (001) substrate 51 by organometallic vapor phase epitaxy. The Bragg reflection film 53 is comprised of twenty pairs of n-type GaAs and n-type $Al_{0.7}Ga_{0.3}As$ sublayers, the n-type GaAs sublayer in each pair has a thickness of $\lambda/4n_{GaAs}$, the n-type

$Al_{0.7}Ga_{0.3}As$ sublayer in each pair has a thickness of $\lambda/4n_{Al0.7Ga0.3As}$, λ is an oscillation wavelength of the surface-emitting semiconductor element of Fig. 3, and n_{GaAs} and $n_{A10.7Ga0.3As}$ are the refractive indexes of GaAs and $Al_{0.7}Ga_{0.3}As$ at the oscillation wavelength λ, respectively. The lowest sublayer of the Bragg reflection film 53 is an AlGaAs layer. Thereafter, the back surface of the n-type GaAs substrate 51 is polished, and a AuGe/Ni/Au n-electrode 60 is formed on the n-type GaAs substrate 51, and heat treatment is performed so as to make the AuGe/Ni/Au n-electrode 60 an ohmic electrode. Then, a Ti/Au Schottky electrode 58 is formed by electron beam evaporation, where the Ti/Au Schottky electrode 58 has a window through which laser light exits. Then, a SiO_2 antireflection film 59 having a thickness of $\lambda/4n_{SiO2}$ is formed over exposed area of the n-type $Al_{0.7}Ga_{0.3}As$ carrier confinement layer 57, where n_{SiO2} is the refractive index of SiO_2 at the oscillation wavelength λ. Finally, the construction of Fig. 3 is cleaved and formed into a chip. Thus, the surface-emitting semiconductor element 61 is completed. In contrast to the first embodiment, no portion of the n type GaAs substrate 51 or the n-type GaAs buffer layer 52 is removed.

Paragraph bridging pages 23 and 24:

A GaN low-temperature buffer layer 82, an n-type GaN buffer layer 83, a Bragg reflection film 84, an n-type GaN optical confinement layer 85, an $In_{x2}Ga_{1-x2}N/In_{x3}Ga_{1-x3}N$ multiple-quantum-well active layer 86 ($0<x2<x3<0.5$), an p-type GaN optical confinement layer 87, an n-type $Al_{z4}Ga_{1-z4}N$ carrier confinement layer 88 ($z4>0$), and a p-type GaN cap layer 89 are formed on a sapphire C-face substrate 81 by organometallic vapor phase epitaxy. The Bragg reflection film 84 is comprised of twenty pairs of n-type GaN and n-type AlN sublayers, the n-type GaN sublayer in each pair has a thickness of $\lambda/4n_{GaN}$, the n-type AlN sublayer in each pair